TEMPORARY CORROSION PROTECTION LAYER

BACKGROUND

[0001] The present disclosure relates to a method for producing a component made of a steel product coated with an Al—Si protective coating.

[0002] Nowadays, steel products such as steel strips or steel sheets are provided with an Al—Si protective coating by means of hot-dip aluminizing to protect against corrosive influences.

[0003] So that local spalling of the protective coating does not occur as a part of the shaping process to form a desired component, the steel products are normally alloyed with the iron of the base material. This requires longer annealing times.

[0004] It is known from DE 10 2008 006 771 B3 that a pre-alloyed Al—Si protective coating produces a reduced heating duration as compared to an Al—Si protective coating that is not pretreated.

[0005] Despite the existing protective coating in the case of steel products that are pre-alloyed in this manner, practice has shown, however, that corrosion (red rust) forms on the surface caused by the weather, for example during storage and/or transport.

BRIEF DESCRIPTION

[0006] Therefore, the problem addressed by the present disclosure is providing a method that overcomes the disadvantages of the prior art.

[0007] According to one aspect, the method for producing a component made of a steel product coated with an Al—Si protective coating includes the following steps:

[0008] providing a substrate consisting of a steel product coated with an Al—Si protective coating,

[0009] heating the substrate to a temperature T_1 such that the Al—Si protective coating is only partially pre-alloyed with Fe of the steel product,

[0010] cooling the pre-alloyed substrate to room temperature,

[0011] applying a corrosion protection oil to the surface of the pre-alloyed substrate, wherein the corrosion protection oil consists of a composition containing fatty acid esters,

[0012] transporting the pre-alloyed substrate to which the corrosion protection oil has been applied,

[0013] heating the pre-alloyed substrate to which the corrosion protection oil has been applied to a temperature T_2 such that the Al—Si protective coating is fully alloyed with Fe of the steel product and the corrosion protection oil is removed without leaving residue, and

[0014] shaping the re-heated substrate to form the component.

[0015] It was surprisingly shown that—along with the additional temporary corrosion protection—the pre-alloyed substrate to which the corrosion protection oil has been applied does not leave any residues after re-heating for the shaping process that have a disadvantageous effect on material performance and thus do not negatively impact other process steps within the production chain.

[0016] In addition, it was surprisingly shown that the heating of the pre-alloyed substrate to which the corrosion protection oil has been applied to the temperature T_2 could be shortened significantly.

[0017] In the case of the method according to one aspect, first a substrate consisting of a steel product coated with an Al—Si protective coating is provided. The steel product in the present case is a steel sheet or steel strip, which is coated with an Al—Si protective coating. Typically the steel product is coated by means of hot-dip aluminizing.

[0018] In a further process step, the substrate is heated to a temperature T_1 such that the Al—Si protective coating is only partially pre-alloyed with Fe of the steel product. The substrate that is not fully alloyed in this manner has a ductility, which allows the substrate obtained to be divided or cut without damaging the protective coating.

[0019] The heating of the substrate to the temperature T_1 can be carried out in this case in a batch-type annealing furnace, chamber furnace or in a continuous annealing furnace.

[0020] These types of Al—Si protective coatings that are not fully alloyed preferably have a Fe content of 25-50% by weight. In an especially preferred variant, the Al—Si protective coating consists of 10% by weight Si, 25-50% by weight Fe and the remainder Al.

[0021] After cooling of the pre-alloyed substrate to room temperature, according to one aspect, a corrosion protection oil is applied to the surface, wherein the corrosion protection oil consists of a composition containing the fatty acid esters. The application of the corrosion protection oil to the pre-alloyed substrate can take place for example by spraying or immersing in a bath containing the corrosion protection oil. Alternatively, the application of the corrosion protection oil takes place by means of a roller application process.

[0022] Alternatively, before cooling to room temperature, the pre-alloyed substrate can be immersed in a bath containing the corrosion protection oil in order to cool it in one process step and provide it with the temporary corrosion protection.

[0023] Then the pre-alloyed substrate to which the corrosion protection oil has been applied is transported. The term transport used here includes all types of transport processes where the pre-alloyed substrate is moved from a first location, for example a steel producer, to a second location, for example a production plant of a steel processing company or a storage facility.

[0024] In a further step of the method according to one aspect, the pre-alloyed substrate to which the corrosion protection oil has been applied is heated to a temperature T_2 such that the Al—Si protective coating is fully alloyed with Fe of the steel product and the corrosion protection oil is removed without leaving residue. As a result, neither cracked carbon chains remain on the surface nor do any corrosive or toxic combustion residues develop during the heating process.

[0025] The heating of the substrate to the temperature T_2 can be carried out inductively, conductively or by means of thermal radiation in a continuous furnace.

[0026] Then the re-heated substrate is shaped to form the desired component.

[0027] It can be preferred that it is a hot forming here. Furthermore, it can be preferred that the component is automobile bodies or parts thereof.